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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Evaluation of Progress in Establishing Physiochemical Treatments in Neuropsychiatry

I. THE PRESENT STATUS OF THE TREATMENT OF NEUROSYPHILIS

A. E. BENNETT, M.D.*
Berkeley, California

1. Asymptomatic Neurosyphilis

With proper dissemination of our knowledge of syphilis, we can prevent most of the late manifestations of neurosyphilis.

Routine spinal fluid studies within the first year of the infection make the diagnosis in the asymptomatic stage of neurosyphilis. From this group, clinical neurosyphilis develops. The progression of these spinal fluid findings determines the type of therapy indicated and also gives a lead to prognosis.

The older conservative type of treatment in the early asymptomatic stage was satisfactory in the majority of cases (90 per cent), but some cases despite this therapy progress into active neurosyphilis. A combination of arsenicals and heavy metal (bismuth) in a course of 12 to 20 injections is given weekly or biweekly. The arsenical of choice is the less toxic mixture of oxophenarsine hydrochloride (mapharsen); the dosage is 1 milligram per kilogram of body weight, or 0.04 grams to 0.075 grams for the usual adult dose. Maximum doses should await establishment of patient's tolerance by smaller initial doses. The drug has low toxicity and is easily prepared and administered. Intravenous injections are given once or twice a week; they should be made rapidly, within 10 to 20 seconds, in order to avoid pain along the course of the injected nerve. At the same time bismuth subsalicylate, 0.2 gm. per cc. of olive oil, is given intramuscularly once a week. Spinal fluid studies must be made every three months; if definite improvement does not occur, more radical therapy must be instituted.

This conservative treatment is only practical for early cases with moderate spinal fluid changes. In those cases in which strongly positive reactions continue despite chemotherapy the treatment of choice is combined chemotherapy and artificial fever therapy. Any form of artificial fever is effective provided the temperature elevation is above 105 degrees F. and is maintained for several hours. For reasons we have described elsewhere we prefer physical artificial fever therapy and have for some years used the hypertherm equipment exclusively. Treatments by this method require experienced, well trained personnel, and mean referring the patient to a center equipped to carry on this type of therapy. Malarial inoculation, typhoid vaccine or other foreign protein types of fever induction can be carried out successfully if artificial fever therapy is not available.

Combined chemotherapy is given with each fever treatment. Bismuth salicylate, 0.2 gm.,

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is given intramuscularly just before the fever therapy session; and mapharsen, 0.04 gm., is given at the height of the induction of fever. These treatments are given at 5-7 day intervals for at least 12 fever sessions of 3 hours each of 105-106 degrees F; the arsenical dosage is increased to 0.06 or 0.075 gm. At the end of 36 hours of fever treatment, a spinal fluid examination is made. If the serology is completely reversed no more fever therapy is necessary, but if the serology remains strongly positive the patient should receive 15 more hours of fever therapy combined with chemotherapy. After a rest of 6 weeks another spinal fluid checkup is made; if a positive reaction remains, a three months' course of arsenicals and bismuth therapy is again carried out.

Treatment with Penicillin

If penicillin is used alone, 50,000 units every 3 hours up to a total of 4 to 8 million units have been recommended by many as an effective treatment for asymptomatic early neurosyphilis. The majority of patients have achieved a normal cell count and total protein value in cerebrospinal fluid; but seldom has a complete serologic reversal resulted. Penicillin combined with fever therapy produces a more rapid response in the reaction of the spinal fluid than does penicillin alone; but the final results have not been better than with the combined chemo-fever therapy.

Penicillin is an adjunct in the management of asymptomatic neurosyphilis but should not be relied upon as an effective single agent. At present we recommend giving penicillin therapy at the beginning of treatment and continuing chemotherapy and fever therapy in all resistant cases of asymptomatic neurosyphilis. This combined treatment requires hospitalization of the patient for 2 to 3 weeks. After the course of penicillin is completed the remaining fever treatments can be carried out on an outpatient basis.

2. Active Clinical Neurosyphilis

(a) Acute syphilitic meningitis:

Although conservative yet vigorous routine chemotherapy may clear up acute meningitis fairly satisfactorily, it is not fair to the patient to allow the risk of neurologic sequelae. Formerly we immediately prescribed combined chemotherapy and fever therapy for these cases; this promptly brought the infection under control, with rapid disappearance of pressure manifestations and high cell count. The results from penicillin therapy have been most encouraging in this type of neurosyphilis; at present it is probably the treatment of choice. In the few instances in which pleocytosis recurs or clinical manifestations are slow to disappear, combined penicillin and chemo-fever therapy should be prescribed.

This form of neurosyphilis is becoming relatively infrequent because of the better management of early syphilis and closer observation of spinal fluid. Only in the neglected, poorly treated patient with systemic syphilis can acute luetic meningitis develop.

(b) Chronic Meningovascular Neurosyphilis:

Treatment of this form of neurosyphilis is often disappointing, particularly in those cases in which vascular accidents have already occurred and residual hemiplegia or focal paralytic manifestations are present. Functional recoveries follow only very early treatment. Many patients are seriously ill with complicating vascular disorders such as aortitis or hypertension. These complications make fever therapy technic very difficult to carry out since many patients cannot withstand malarial therapy. Because the height and the duration of fever can be controlled, artificial physical fever can be used, with such precautions as starting the patient with short fever sessions and gradually increasing them according to the patient's general physical condition.

The inactive seronegative vascular types in which vascular thromboses have occurred are not favorable prospects for any form of therapy. The best to be hoped for is to delay progression of the disease.

The treatment of choice is still combined chemotherapy and artificial fever similar to the technic described above. The role of penicillin is yet undetermined in this form of neurosyphilis. Reported cases are too few for drawing of conclusions, but penicillin should be added to the list of trial therapeutic agents.

Iodide therapy has a definite place in this type of neurosyphilis; a course of it should

be given between courses of specific therapy; a saturated solution of either sodium or potassium iodide, given up to physiologic tolerance, about 10 to 25 grs. three times a day. In certain acute manifestations of meningovascular involvement such as angiospasms, aphasias, cranial nerve palsies or convulsive episodes, iodides can advantageously be given intravenously; a 10 per cent solution of sodium iodide, starting with 40 grs. daily and increasing the dose by 20 grs. each day up to a total of 150 grs. a day. This dosage has never caused symptoms of iodism in my experience. In thus giving a course of 10 to 12 injections one must gauge the length of treatment time by the fluid serology and clinical symptomatology.

(c) Tabes Dorsalis:

Therapeutic results are more controversial in this type than in other forms of neurosyphilis. Results vary according to the duration of the symptoms, degree and type of involvement and presence of positive or negative serology. Certain tabetic symptoms are notoriously refractory to treatment; others respond well.

Routine chemotherapy in early tabes obtains good results in about 50 per cent of cases. These results do not justify relying upon straight chemotherapy, and the risk of progression to more serious disabling symptoms is too great. In early tabes dorsalis, combined fever-chemotherapy is the treatment of choice. Malarial therapy is not well tolerated by tabetic patients. Mortality and morbidity are higher than in paretic dementia. It is contraindicated in advanced ataxic states or with complicating associated infectious processes such as cord bladder. Other fever producing agents such as typhoid vaccine or nonspecific protein are preferable.

The best reported results have followed artificial fever therapy because the height and duration of fever can be accurately controlled. Arsenicals of choice are either bismuth arsphenamine sulfonate (bismarsen), 0.2 gm. intramuscularly with each fever session; or bismuth salicylate, 0.2 gm. before the fever session and mapharsen, 0.04 to 0.06 gm., at the height of the induced fever. There should be 10-15 fever sessions of 3 hours each, of 105 to 106 degrees F. Pentavalent arsenicals, such as tryparsamide, are contraindicated in tabes because of the frequency of optic atrophy.

The role of penicillin in tabes dorsalis is not settled. Reports are too meager for drawing conclusions. A course of 8,000,000 units may be given with or followed by fever therapy. Penicillin alone does not seem justifiable.

After the course of fever-chemotherapy, further treatment must be individualized according to the nature of the disabling symptoms and serologic reaction. If evidence of clinically active disease and serologic positivity remains, a modified course of arsenic, bismuth and iodine therapy must be continued.

In more chronic disabling tabes with such symptoms as intractable lighting pains, gastric crises, ataxia, urinary incontinence, optic atrophy and charcot joints, the therapeutic problem is more difficult and no routine treatment can be prescribed. Treatment will materially benefit some cases, leave others unimproved. Many of these patients come for help too late; they are seronegative, burned out cases that fail to respond to specific therapy, but may receive some benefit from symptomatic treatment.

Neuritic pains: Lightning pains of tabes are the commonest symptoms that bring the patient for treatment. These too often become chronic symptoms before proper diagnosis is made. The above described therapy brings complete relief in about 75 per cent of cases in the early stages. In the more advanced stages, only about 50 per cent can be well controlled. In cases with recurrent attacks of pain and negative serology after adequate courses of chemo-fever therapy, various symptomatic therapies may be tried, with some relief of pains. But relapses occur and finally no single method will give results. The following procedures have been recommended with varying degrees of success.

Before the advent of fever therapy the most popular method was the Swift-Ellis treatment: an intravenous injection of an arsenical is given; 30 minutes later, 50 cc. of blood are withdrawn and placed in sterile tubes. After over night refrigeration the clear (not hemolyzed) blood serum is pipetted off; about 20 cc. are thus obtained. This serum is inactivated in a water bath for 30 minutes at 56 degrees C. temperature, whereupon it is ready for intraspinal injection. Spinal

drainage with removal of the same amount of spinal fluid is done and the inactivated clear arsphenamized serum is either injected slowly without pressure or run in by gravity. Each of the 6 treatments, given at 2-week intervals, requires hospitalization of the patient for 24 to 48 hours. This no longer popular therapy does in certain cases give dramatic relief from neuritic pain. Usually an exacerbation of pain and high spinal fluid pleocytosis are followed by a period of freedom from pain. The benefit probably comes solely from the febrile, aseptic meningeal reaction produced. Fever therapy consistently gives greater relief.

Deep x-ray therapy has been recommended for relief of intractable tabetic pains. Patients have failed to obtain benefit in the few trials in my experience.

Intravenous iodide therapy as described under meningovascular forms is a conservative treatment seemingly of value and worth trial.

Intrathecal injections of thiamine hydrochloride, 50 mgs., have been recommended and in isolated instances have benefited my patients. Severe meningeal reactions have occurred and this method may be dangerous, as may be the use of intrathecal penicillin.

Neurosurgical procedures are the last resort in incurable, completely disabled patients. A high cervical chordotomy or prefrontal lobotomy may be done, but either procedure must be considered an operation of desperation.

Gastric Crises: These prostrating attacks of abdominal pain with vomiting or nausea and vomiting alone are the most refractory of tabetic symptoms. All comments about relief of neuritic pains apply to this subject. The same treatment procedures given in the early stages may bring excellent results. In chronic advanced cases everything may fail, and the patient become a psychiatric problem complicated by morphine addiction—a miserable neuropsychiatric problem. If all else fails, chordotomy or prefrontal lobotomy may be finally recommended.

Ataxia: If ataxia is of short (only a few months') duration, artificial fever and chemotherapy may produce a surprising degree of improvement. In the advanced stage no amount of therapy influences the symptom. However, there is value in re-educative exercises (Frenkel), by which the patient carries out purposive movements under ocular control to overcome the loss of deep sense of position sensibility. By such retraining the patient can learn to overcome a surprising degree of ataxia. Malarial therapy is contraindicated.

Urinary Incontinence: Just as with ataxia, if cord bladder symptoms are of recent origin, often gratifying improvement will follow from fever-chemotherapy. In later stages little can be done for hypotonic tabetic bladder except cystometric studies and experimentation with drugs that may aid in bladder contractile power, to overcome relaxation. A group of choline esters that act primarily as a stimulant of the parasympathetic nervous system, such as mecholyl or doryl, 25 mg. for hypodermic injection or 2 mg. tablets for oral use, increase the tonus of the detrussor muscle and aid in emptying the bladder. Furmethide, 3 mg. hypodermic or 10 to 30 mg. oral doses, has also been used for symptomatic relief. In some cases transurethral resection of the vesical neck of the bladder allows the atonic detrussor muscle to expel urine. Malarial Therapy is contraindicated.

Optic Atrophy: Results in treating optic atrophy, a complication of any form of neurosyphilis but more frequently seen in tabes, are difficult to evaluate. In our personal experience we have been more encouraged with combined fever and chemotherapy in arresting the process than with any other form of therapy. Arsenicals combined with fever must be used cautiously and pentavalent arsenicals of the tryparsamide group are contraindicated, since rapid total blindness may occur even with careful checks of the visual fields. Chemotherapy alone is not justified in treating optic atrophy. The combined use of penicillin and fever therapy offers more encouragement in arresting optic atrophy than do other methods and should be instituted as early as possible.

Charcot Joints: Arthropathies and trophic ulcers—all of them late manifestations of tabes dorsalis—are usually seen in the inactive, burned out seronegative stage along with gross evidence of locomotor ataxia. No form of specific therapy influences favorably any of these manifestations.

(d) Dementia Paralytica:

The successful treatment of general paresis depends largely upon the stage of the disease. Ninety per cent of successful results are obtained within two years after onset of mental symptoms. In early paresis favorable results can be obtained in 50 to 75 per cent of cases. In moderately advanced cases about 25 per cent can be improved; while in severe advanced paresis there is less than 10 per cent chance for improvement. These results again emphasize the extreme importance of early preparetic diagnosis in the so-called asymptomatic state, thus preventing paretic dementia. We have found that electroencephalographic examination, with evidence of electrocortical dysfunction in the temporofrontal region along with a paretic formula in the spinal fluid, is the earliest clinical evidence of preparetic dementia and the optimal time to get a complete clinical cure of the disease.

Before the advent of Wagner Jauregg's malarial therapy for general paresis all treatment was ineffective. After that monumental contribution it was soon found that artificial induction of fever by whatever means produced remissions in the disease. Artificial physical fever therapy in experienced hands has consistently produced a higher percentage of clinical remissions—better serologic reversals, with lower mortality. The treatment of choice in our experience for 15 years has been combined artificial fever - arsenical - bismuth therapy, with, more recently, one or more courses of penicillin. The treatment is begun carefully with small doses of mapharsen and induction of fever, avoiding reactions; then continued at 5-7 day intervals for at least 12 sessions of 105 to 106 degrees F. If serologic reactions are still strongly positive, the treatment is continued to 50 hours of fever above 105 degrees F. The penicillin is started at the beginning of the course, with 50,000 units every 3 hours until a total of at least 8,000,000 units has been given. Near the end of fever therapy if serologic reactions are not completely reversed another course of penicillin is given. We do not believe that penicillin alone can cure true paretic dementia. We examine by electroencephalography before and after treatment, and the return to near normal in the brain wave pattern is a guide in prognosis.

In order to sustain blood levels of penicillin the use of 4 1 carboxyphenyl-methanesulfonilide (caronamide) has been found very useful. This drug blocks the excretion of penicillin via the renal tubules, thus maintaining a consistently high blood level.

At the end of treatment a 6-weeks' rest period is given; spinal serology is rechecked; if it is strongly positive, routine chemotherapy—weekly injections of bismuth and mapharsen—are carried out for 3 months, 6 months or a year, depending upon clinical and serologic conditions.

The successful treatment program of general paresis usually includes other psychiatric treatment within a psychiatric department: Nursing management of excitement states, nutritional care to avoid weight loss, and in a few very disturbed, manic-like cases of excitement or severe depressions a course of 6 to 12 electroshock treatments between the fever sessions. Electroshock therapy gives symptomatic relief of the affective reactions of general paresis, but in no way favorably influences the symptoms of intellectual deterioration. This treatment program likewise includes repeated psychiatric sensorium examinations to note progress of treatment in relieving the evidence of an organic psychosis.

(e) Miscellaneous Forms of Neurosyphilis:

Congenital Neurosyphilis: We use the same treatment for these cases as outlined for general paresis. Although our results are not striking, all other forms of therapy have been notorious failures. We have prevented blindness and have improved hemiparetic features and also organic sensorium deficiencies. Artificial fever plus chemotherapy and penicillin is the only combination of treatments that can help these unfortunate cases.

Isolated Cerebral Gummata: This very rare form of cerebral syphilis is seldom seen. Treatment is both chemical and surgical. Where localizing signs of a space-filling lesion are present the gumma should be removed; removal is then followed by chemotherapy, iodides and possibly fever therapy.

Organic Epilepsy: The occurrence of seizures, either Jacksonian, petit or grand mal type, is a frequent symptom in various forms

of neurosyphilis, but is most frequently seen in meningovascular and paretic dementia types. Seizure states are not favorably influenced by any form of specific therapy and usually have to be controlled by symptomatic, persistent anticonvulsive medication: combinations of sodium dilantin, phenobarbital, mesantoin and tridione, according to the clinical condition and electroencephalographic records. Good results usually follow such treatment, but medication must be continued indefinitely, even after all evidence of active neurosyphilis is gone.

Persistent Seropositive (Wasserman-fast) Cases: The rapidity of serologic reversals in either blood or spinal fluid does not always parallel clinical improvement and depends upon many factors. Probably the most important is the duration of infection. Neither does the persistence of positive blood and spinal reactions mean clinically active disease. The management of these cases is an individual problem guided by the clinical picture. Frequently after sufficient therapy has been given to assure one there will be no further progression, one may have to reassure the patient that further treatment is unnecessary and that time alone may produce seronegative reaction. Psychotherapy plus an occasional recheck of the neuropsychiatric condition and serologic studies in order to spot possible recurrence is the proper management of these cases.

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Author's Note: This is the first of a series of three articles on the "Evaluation of Progress in Established Physiochemical Treatments in Neuropsychiatry."

The voluminous literature of the past fifteen years, much of it controversial, has made evaluation of these therapies extremely difficult. Much practical experience, various research projects and extensive reviews of the literature have enabled the author to keep abreast of changes in these treatment procedures. The body of material so collected has formed the basis for university and hospital teaching, lectures at medical meetings and staff clinics, and articles and chapters in current publications.

It is the aim of this series of articles to survey the established therapies and to evaluate their usefulness. The following topics will appear in forthcoming issues of *Diseases of the Nervous System:*

"The Use of Insulin in Mental Illness."

"The Use of Electroshock in the Total Psychiatric Program,"

Problem of the Criminal Sexual Psychopath*

GEORGE H. COOK, M.D.
Ionia, Michigan

In only seven of our 48 states, California, Illinois, Massachusetts, Michigan, Minnesota, Ohio and Winconsin, are there statutes relative to sex behavior and in very few of these are the statutes enforced.[1] In Michigan the first sex behavior legislation was enacted in 1935, revised in 1937 and finally in 1939 replaced by the present Sex Behavior Law Act 165, Public Acts 1939. This law provides that an individual guilty of illegal sex behavior for more than a period of one year and who is not insane nor feebleminded is a criminal sexual psychopath and as such shall be committed to the Department of Mental Health to be placed in a suitable institution for care and treatment and shall remain under the supervision of the Department of Mental Health until completely cured of his psychopathy. Provisions are made for parole in the discretion of the Department of Mental Health and recall from parole by the Department in its discretion, an overt illegal act not being required to constitute a parole violation. Upon determination that the patient has recovered and a subsequent decision by the committing court, the patient is set free and is immune from any action against him for the illegal sexual acts he may have committed during the period of his psychopathy.

Since the enactment of the sex behavior laws in Michigan, 237 criminal sexual psychopaths have been committed by various criminal courts to the Department of Mental Health. The Department of Mental Health has designated two Michigan Institutions as suitable for the care of these patients, to wit: Ionia State Hospital, the State Hospital for Criminal Insane and under the direct jurisdiction of the Department of Mental Health, and the State Prison of Southern Michigan, the largest of the state prisons and under the jurisdiction of the Department of Corrections. Arrangements and agreements have been made between the two departments providing for transferring of patients from one institution to the other and for their care and treatment at either of the institutions. All criminal sexual psychopaths are initially admitted to Ionia State Hospital where they are observed and diagnosed and at the end of sixty days reported to the Department of Mental Health with recommendations as to further care and treatment of the patient. They are then either kept at the Hospital for intensive treatment or transferred to the State Prison of Southern Michigan, there to remain until re-ordered to the Hospital. All paroles are made subsequent to a 30 to 60 day period of observation and study and report with recommendations to the Department of Mental Health.

Occasionally a patient may be removed from either the Hospital or the Prison on a court order and after a hearing a judicial decision as to the individual's mental condition is made and he is either freed by the court or returned to the Hospital or Prison. Patients sent to the State Prison remain the responsibility of the Department of Mental Health and are interviewed monthly by a physician from Ionia State Hospital who makes a detailed report with recommendation as to advisability of patient's continued residence at the State Prison or possible retransfer to Ionia State Hospital for parole consideration or for more specialized or intensive type of treatment. These monthly reports are conveyed to the Department of Mental Health by the Hospital Superintendent with such additional comments as may seem pertinent. During the patient's residence at the State Prison he is governed by rules and regulations determined by the prison authorities. Patients selected for transfer to the State Prison of Southern Michigan are those thought not amenable to hospital therapy at that particular time. Experience has shown that the punitive effect of such transfer to the State Prison of Southern Michigan is definitely of therapeutic value, especially in certain types of personalities. The indefinite period of the patient's stay at either institution and its dependence on the patient's pro-

*From the Ionia State Hospital, P. C. Robertson, M.D., Medical Superintendent.

gress, as indicated by his behavior, is also definitely of therapeutic value.[2,3]

The information at the time of the original arrest almost invariably alleges one of the following five classes of sexual misconduct: 1) Indecent Exposure; 2) Indecent Liberties; 3) Gross Indecency; 4) Rape; 5) Soliciting.

Occasionally an arrest is made on a charge of using obscene and indecent language and, still less frequently, an individual may be taken in custody on an information not related to sexual deviation but may be charged with breaking and entering or for destruction of property or an assault, etc., the individual's sexual deviation coming to light upon investigation relative to the actual arrest.

Herein lies the danger of abuse of the statute. A not over scrupulous prosecutor encountering an individual with a good defense to the charge on which he was arrested, may discover a sexual deviation in this person and proceed to prosecute on this technical basis merely to secure a commitment where otherwise the culprit might have been acquitted. It will be noted that the original charge indicates little relative to the individual's actual sex deviation (whether he is homosexual, heterosexual or bisexual, etc.).

Any individual charged with indecent exposure may be homosexual or heterosexual or bisexual (exposure to either male or female being equally satisfactory). This individual may expose himself exclusively to children or only to adults. A homosexual person may be only active or only passive or both. He may show interest in only a specific type of homosexual deviation such as fellatio or he may derive satisfaction from several homosexual perversions, i.e., fellatio, sadism, or masochism. Similar variation pertains to all sex deviants and not to the homosexual alone. Sex deviants may partially or almost totally be repressed except when repressing mechanisms are relaxed under the influence of alcohol or other drugs.

Factors involved in production of the sex deviant are principally of four categories:[2-11] 1) Endocrine; 2) Heredity; 3) Neurological; 4) Psychological. Each of these elements is capable of being subdivided many times and an indefinite number of combinations of etiological factors may be present in a patient. A homosexual who habitually assumes only feminine roles in one or more perversions may or may not show physical evidence of femininity. He may or may not show personality traits which are predominantly feminine. He may or may not present neurological and/or EEG evidence of a central nervous system dysfunction. His family history may or may not indicate probability of good or bad heredity and careful investigation may or may not reveal evidence of psychological influence.

The average age of the 237 criminal sexual psychopaths admitted to the Ionia State Hospital is 38.1 years. Of the total number 126 or 53 per cent were transferred to the State Prison of Southern Michigan. Of these 15 patients were discharged by court order, 9 were paroled on order of the Department of Mental Health (prior to 1944) and 2 died, making a total number of 26 patients discharged from the State Prison by means other than re-transfer to the Ionia State Hospital. Fifty-two patients have been returned to the Ionia State Hospital, making a total of 78 discharges from the State Prison. Sixty-one criminal sexual psychopaths are at the State Prison at the present time (January 15, 1948). Adding the discharges and the number still at the prison the total is 139, thirteen more than the 126 patients sent to the State Prison of Southern Michigan. This apparent discrepancy is accounted for by duplicate transfers of some patients.

A total of 69 criminal sexual psychopaths have been paroled which is 29 per cent of the admissions. Twelve patients violated parole which is 17 per cent of the number paroled (69), thus 83 per cent of parolees have been successful up to the present date. Many of these have been adjudicated recovered from their psychopathy, some have been on parole nearly three years and some for a lesser period of time. Of the twelve parole violators five or 41.5 per cent had spent from one to five years at the State Prison of Southern Michigan prior to their parole, 58.5 per cent were continued at the Ionia State Hospital from admission until parole, 37 per cent of all parolees spent from six months to five years at the State Prison prior to parole. It will be recalled that 29 per cent of the total admissions were paroled, 53 per cent of the total admissions were sent to the State Prison of Southern Michigan, thus parolees from the group sent to the

State Prison of Southern Michigan were 16 per cent less than that from the group remaining continuously at Ionia State Hospital. Parole violators were 17 per cent fewer in the group which was sent to the State Prison indicating an approximately equal ratio of parole violators from both groups.[15] The average age of successful parolees is 36 years and of parole violators 28½ years.

Further study of the twelve patients who violated parole shows that at the time of the arrest which resulted in their original commitment as criminal sexual psychopaths, seven were charged with indecent exposure, one with rape, two with gross indecency, and two with indecent liberties. At the time of parole violation two were charged with using alcohol (non-sexual), two with gross indecency, two with indecent liberties and six with indecent exposure.[15] Thus 50 per cent of parole violations result from indecent exposure, 16-2/3 per cent from gross indecency, and 16-2/3 from indecent liberties. Five of the six parole violators resulting from indecent exposure were committed originally on the same charge. The last of the six had been originally arrested on information for indecent liberties. Of the two parole violations resulting from the use of alcohol, one violator was originally arrested on an information for gross indecency, the other had been originally arrested for indecent exposure. Of the two parole violations attributed to gross indecency, in the one case the arrest had been due to indecent exposure, the other to gross indecency. Of the two parole violators accused of taking indecent liberties, one was originally arrested on an information for rape, the other for indecent liberties.

It will be noted that seven of the twelve parole violators repeated the offense that caused their original arrest and commitment as a criminal sexual psychopath. Seventy-five per cent of parole violations occurred in the Detroit area which is in accordance with the percentage of total admissions and total paroles. Twenty-five per cent of the parole violators were total abstainers as compared with 23 per cent total abstainers in the total group of 237 criminal sexual psychopaths admitted. Fifty-five per cent of the total group of criminal sexual psychopaths used alcohol moderately. Twenty-two per cent are either chronic alcoholics or periodically have become excessively alcoholic. Parole violators had been confined an average of 35 months prior to parole.[2,3] The freedom of parole violators was an average of 12.6 months duration. This period varied considerably, however; the shortest being ten days and the longest two years and five months. The parole violators being apprehended for indecent exposure remained on parole for the shortest period of time. Two of the twelve parole violators exhibited homosexual deviations, they indulged in both hetero and homosexual activities, and were alcoholic at the time of original admission and at the time of parole violation. Of the total group of 237 criminal sexual psychopaths admitted, 40 per cent showed homosexual deviation. Of the total group of paroled patients 30 per cent showed homosexual deviation.

Toward the latter part of 1946 a policy of routine EEG and Rorschachs was instituted. The nearest available EEG machine was at the Neuro-Psychiatric Institute, Ann Arbor, Michigan and patients about to be paroled were transported there for the tests. Previously only patients on whom the tests were desired because of clinical aspects of the case were sent to Ann Arbor. This number was not great. A total of 21 criminal sexual psychopaths were given EEGs and Rorschachs at Ann Arbor up to February 1947, when the Ionia State Hospital had its electroencephalograph installed, and since that date and until January 15, 1948, 82 criminal sexual psychopaths were given EEGs. Rorschach tests have also been done routinely at this hospital since that date. There were repeats on some already done at Ann Arbor and some at the Ionia State Hospital were also repeated. A total of 103 patients were given EEGs and Rorschachs (21 at Ann Arbor and 82 at Ionia State Hospital). Three of these were considered invalid and the total group thus comprised 100 criminal sexual psychopaths. Fifty-five of the group showed abnormal EEGs.[4-14] Forty-five showed normal or borderline, of which nine were Ann Arbor cases and 36 Ionia State Hospital cases, making 43 per cent of the Neuro Psychiatric Institute cases normal or borderline and 44 per cent of the Ionia State Hospital cases normal or borderline. Of these, 45 cases or 42 per cent were homosexual, 24 per cent had

electro shock therapy (70 per cent of these were done prior to making the EEGs), 37 per cent were excessively alcoholic, 48 per cent were moderately alcoholic and 13 per cent abstainers. Of the 55 patients comprising the abnormal or borderline group, 42 per cent were homosexual, 14 per cent had had electro shock therapy (here again 70 per cent had received this treatment prior to the time EEGs were obtained), 38 per cent were excessively alcoholic, 53 per cent were moderately alcoholic and 9 per cent were abstainers; 64 per cent of the *abnormal* group had histories with neurological findings and/or other evidence of organic brain disease.[6] Of the normal group 19 per cent had histories or findings indicating probable organic brain disease. Thus organic brain disease was indicated by findings other than EEGs three times more frequently than in the normal and borderline group; 14 per cent of the abnormal group had electro shock treatments (70 per cent of which were given this treatment prior to EEGs), 12½ per cent of this group were known epileptics, 8 per cent were close relatives of known epileptics, 12½ per cent had a definite history of severe head trauma, 10 per cent had neurological findings indicative of organic brain disease. In some cases more than one of the above listed indications of organic brain disease were found. Others of the group had but one of the indications of organic brain disease besides the EEG evidence.[6] These figures compare with a group of 44 patients given EEGs at Ann Arbor[10,12,13,17] comprising patients at the Neuro Psychiatric Institute, psychotics and psychoneurosis, and was used in a study of electro shock effect on EEGs. Pre-electro shock EEGs on this mixed group of patients showed 50 per cent normal and 50 per cent borderline or abnormal.[17] It was noted that those having psychoneuroses with obsessive compulsive features and depression had 80 per cent abnormal pre-electro shock EEGs.[17] Schizophrenics with depression showed 62.5 per cent abnormal and borderline EEGs and simple psychoneurosis with depression showed the lowest percentage of abnormal EEGs, i.e., only 25 per cent falling in abnormal or borderline classification. The group of depressive (comprised of manic depressions and involutional depression) was intermediate, showing 37.5 per cent EEGs as abnormal or borderline. Finley and Campbell[18] found that a normal control group of 215 showed 30 per cent abnormal or borderline EEGs as compared with a group of 500 schizophrenics who showed 60 per cent abnormal or borderline EEGs. Thus, our group of 100 criminal sexual psychopaths on whom EEGs were done with results of 55 abnormal and 45 normal or borderline was not unusual from this point of view when compared with any of the above mentioned groups, especially when it is recalled that 14 per cent of the EEG cases had electro shock treatment, 70 per cent of the treatments having been given prior to the EEGs.

Abnormal brain function certainly plays a considerable role in the production of the criminal sexual psychopaths. However, other factors are of great importance. Endocrinology, psychology, heredity and environment are additional variable and interdependent factors involved in the criminal sexual psychopathic personality. Endocrine dysfunction is noted especially in the very young and very old criminal sexual psychopath (as seen at this hospital). These cases are definitely amenable to appropriate endocrine therapy, definite physiological as well as psychological changes resulting.

Lt. Col. Loeser, describing homosexuals in Army service who came under his observation, stated that approximately one-third show definite secondary feminine sex characteristics.[3] He also estimates that approximately 50 per cent of homosexuals suffer from a neurosis resulting from conflicts developed relative to their deviation and he believes that this latter group only is amenable to psychotherapy. This group has marked inadequacy reaction, feelings of guilt relative to masturbation, and most of these patients, he feels, are heterosexuals who have repressed this outlet because of severe feelings of inadequacy in this sphere, with eventual experimentation and finally regression to the homosexual level. He stated there are marked obsessive-compulsive trends in this group (with an accompanying syndrome of conflict and tension) and that their adjustment is never secure and should be diagnosed as compulsive-obsessive neurosis with symptoms centering about the psychosexual field. He states that 35 per cent of homosexuals were found to have some degree of neurosis but that only 7 per cent of suf-

ficient severity to have required treatment prior to diagnosis as homosexuals. The use of alcohol by homosexuals is reported in the same reference as: excessive 35 per cent; abstainers 16 per cent; chronic alcoholic 2 per cent; moderate alcoholic use 47 per cent. The averages of all criminal sexual psychopaths at this hospital were found to be: abstaining 23 per cent, excessive 22 per cent, moderate 55 per cent.

In a recent editorial[2] in a medical journal, it was asserted that "Man is more than his endocrine and more than his mind, conscious and unconscious; man is an integration of many factors from forgotten childhood experiences to the subtleties of biochemistry, all of which act and react on each other, producing the individual. Just how far and to what extent any factor may be responsible for homo- or heterosexuality is utterly impossible to determine without many years of research. All that can be said is that the subject is one in which (1) biochemistry, (2) psychology and (3) neurology are closely and critically involved." With this we are in full agreement. However, the editorial continues, "To imprison a man for homosexuality and to be content with this primitive expression of our abhorrence is like jailing a man for not supplying himself with insulin." The editor expresses belief that "present laws regulating sex behavior are ignorant, vindictive and ineffective." We cannot lend support to this conclusion. We have found that imprisonment is a very valuable therapeutic implement in treating certain types of criminal sexual psychopaths. After two months observation, those showing "better than average" evidence that they might benefit from hospital treatment are retained at the Ionia State Hospital. There were 111 patients in this category. Those who seem unlikely to gain from active therapy are transferred to the State Prison of Southern Michigan. There were 126 of this type. Of the 69 patients paroled 34 were from the group retained at the hospital and 35 transferees sent to the State Prison. Of the 69 paroled patients 12 became parole violators, 6 were from the hospital group and 6 from the State Prison group. It is felt that considerable benefit is derived from the transfer to the State Prison. All patients (since 1943) are required to be under preliminary observation at the Ionia State Hospital for 30 to 60 days before being paroled. The total number of parolees (69) averaged 25 months confinement. Those who were sent to the State Prison as poor prospects spent varying periods at that institution, before being returned for parole from the Ionia State Hospital, ranging from eight months to five years.[6]

Under Michigan Law the criminal psychopath is not finally released until considered cured but he may be paroled at the discretion of the Department of Mental Health at any time it is thought advisable. The indefiniteness of the commitment is brought home very forcibly to the criminal sexual psychopath when he is sent to the State Prison of Southern Michigan where all other inmates are serving specific terms or at least know a maximum and minimum term with certain allowances for good behavior. He is not called a prisoner or convict but a visitor and he gets a short number instead of one of five digits such as the ordinary convict carries. For the most part criminal sexual psychopaths are segregated. Many prisoners spurn them as a group, other prisoners, themselves sex deviates, attempt to curry favor with the criminal sexual psychopath which arouses unwished for publicity for him. The finger of accusation is continually pointed in his direction.

This author has visited the State Prison of Southern Michigan each month since the beginning of 1943 and has interviewed the criminal sexual psychopaths and has thus had ample opportunity to observe their reactions when placed in the prison environment. The individual who has perhaps been rather well adjusted in his deviated world becomes definitely frustrated. The lad who lacks maturity in the emotional sexual sphere will suddenly develop a maturity that is surprising. The criminal sexual psychopath who has previously denied his guilt or the one who has spurned any kind of treatment tend generally to take new stock of their situation and make a readjustment accordingly. It is recognized and freely admitted that all of these changes do not represent a true alteration of the individual's personality but rather his effort to escape the new environment. The punitive effect is cumulative and, of course, much greater in some instances than in others. When this effect has reached a

maximum without development of too much paranoid thinking, where some hope is left, the patient is returned to the Ionia State Hospital for parole consideration. Superficially he is a different person. He may still remain subconsciously or even consciously a sexual deviate. The uncooperative have become cooperative, the immature have developed, and the liars speak the truth. Eighty-three per cent of these men have returned to society and have been able to make a satisfactory social adjustment with follow-up for periods up to six years. Those that fail in this adjustment and become parole violators are no more numerous than the corresponding patients from the group retained at the hospital for intensive therapy. Who can truly say that the individuals of one group are more truly cured than those of the other? Lt Colonel Loeser has stated that only those homosexuals who suffer from a neurosis are amenable to treatment, meaning those individuals who because of blocking mechanisms have become inhibited in heterosexual relations and have regressed to a homosexual level.[3,20] Perhaps this is the true mechanism of the punitive therapy described above. The sexual deviate, who, free from neurosis, is placed in an environment that is much more favorable to the development of a neurotic condition. The patient can then be relieved of his neurotic manifestations and restored to a condition of normal confidence but is not allowed to forget that should he regress in his sexual conduct he can be returned to the dreaded environment. It is felt that a sort of conditioned reflex of good conduct is gradually established with the passage of time.

These criminal sexual psychopaths are not released from parole for at least three years. Like their confinement, their parole is indefinite. Our so-called "recovery" rate is still slightly less than one in three. This is much higher than was anticipated by the most optimistic persons. Nevertheless, there is still a gradual growing accumulation of criminal sexual psychopaths to be confined and cared for by the State. The answer to this problem remains to be worked out, possibly along the same lines that will prevent the continued accumulation of psychotic patients in our State Hospital, i.e., research and development of improved and efficient preventive psychiatry. It is hoped that our experience may have added something to the understanding and treating of the already developed sexual deviate that has been and is such a problem for all of us.

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Clinical Use of E.C. 110, A New Headache Remedy

(PRELIMINARY REPORT*)

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The evaluation of any treatment for headache is notoriously difficult. Few, if any, disorders are so involved with functional components. The frequency with which emotional factors can cloud a clinical picture is nowhere better illustrated. The personalities of the patient and the investigator, the enthusiasm of both, the method of approach, and the success of any "new" treatment must be considered. Innumerable forms of treatment have enjoyed transient popularity, only to fail on long-term trials.

The use of ergot and ergot alkaloids dates back to 1883.[1] Ergotamine tartrate (Gynergen) has enjoyed an excellent reputation in the treatment of migraine headaches, and its use is firmly established. Newer forms have certain advantages. Ergonovine seems to be a little more effective (and less toxic) by mouth than ergotamine tartrate by mouth, although the oral route is inferior to hypodermic administration. Dihydroergotamine (D.H.E. 45) is as effective as ergotamine tartrate by hypodermic injection, and has fewer side effects.[2] Unfortunately, it has not yet been available in an oral form. The mechanism of the relief of headache by ergot seems to be a reduction in amplitude of excursion of pain-sensitive blood vessels.

Our experience with E.C. 110, a combination of two well established drugs, ergotamine tartrate (1 mg.) and caffeine alkaloid (100 mg.), has been favorable, and we feel that it merits further trial. Horton, Ryan and Reynolds[3] reported their results with E.C. 110 in 55 patients and state that 56 per cent obtained excellent results, 24 per cent obtained some relief and that 20 per cent did not obtain any relief at all. Friedman and Brenner[4] reported their findings with E.C. 110, which they found more effective in relieving migraine attacks than either ergotamine tartrate alone or Dihydroergotamine.

Caffeine enjoys almost universal lay popularity in the treatment of headache, witness the huge consumption of coffee, cola beverages, and caffeine-containing analgesics (A.P.C., Anacin, ASA compound, Empirin compound, etc.), for headache. The mechanism seems to be a reduction in blood volume, with a further decrease in amplitude of excursion of pain-sensitive blood vessels.

Theoretically, then, the combination of an ergot alkaloid, such as ergotamine tartrate, and caffeine would be synergistic in its effect in relieving certain headaches, such as migraine, which are due to abnormal blood vessel pulsation.

Case Histories

Case 1: Mrs. H., age 34, has had headaches all of her life, becoming worse after a hysterectomy one year ago. They have been almost continuous during the last year. They are generalized, are worse on arising, and are often associated with nausea, soreness in the face, and the eyes water. Aspirin-phenacetin-caffeine tablets give no relief. During the past year the patient has spent an average of three days a week in bed, because of the headaches. Our diagnosis was "headache on the basis of vasodilatation secondary to emotional tension." She was placed on one tablet of E.C. 110 morning and evening. She reports no headaches as long as she continues to take the tablets this way and immediate recurrence if she lapses treatment. No ill effects have been noted.

Case 2: Miss D., age 22, has had almost continuous headaches for the past 6 months. They are generalized, have no periodicity, are not associated with other symptoms, and no common remedies have been effective. We believe that the basis was an encephalitis 2 years previous. E.C. 110 has failed to relieve a headache only once, when 5 tablets in succession had no effect, except to make her restless. Otherwise, she has always been able to relieve the headache with 2 or 3 tablets. She insists on keeping a supply of the tablets handy.

Case 3: Mrs. F., age 73, has had occipital

*From the Salt Lake Clinic.

headaches and tension in the back of the neck for about 1 year, attributed to an anxiety state. A two-week running tour through the pharmacopeia was fruitless. E.C. 110 was tried without hope, and proved to be ineffective. On the two occasions she could be induced to take them she vomited within 5 minutes. Psychotherapy is indicated but the patient refuses to cooperate.

Case 3: Mr. B., age 71, has had typical migraine headaches most of his adult life. At first he was more concerned about the indigestion, constipation, and scotoma but in recent years complains bitterly about the headache which lasts about 2 days, and comes on about once a week. E.C. 110 relieves nearly all of the headaches. "It is the most effective of anything I have ever taken for relief." No ill effects have been noted.

Case 4: Mrs. C., age 36, has had periodic migraine headaches about once a month. One E.C. 110 tablet taken at the onset of the scotoma, gives prompt relief of the scotoma, and prevents the headache. If taken later, it gives no relief.

Case 5: Mr. J., age 38, has had hemicranial headaches, lasting several hours, usually coming on in the afternoon once a week, off and on all of his life. His father had similar headaches. The only warning is a slight generalized headache in the morning. One E.C. 110 tablet, taken on the morning of an anticipated headache, gives relief of the slight headache and prevents the typical hemicranial headache. Once he failed to take a tablet at his usual sign of warning and developed a typical hemicranial headache which could not be relieved with E.C. 110.

Case 6: Mrs. G., age 29, has had headaches on a clear-cut psychoneurotic basis for about 1 year. They consist of supraorbital and occipital tension and pain. E.C. 110 gave equivocal relief but not enough to continue.

Case 7: Miss B., age 19, has had several typical migraine headaches for 4 years. E.C. 110 tablets "work wonders, I have never had to take the second pill." She was without tablets for one month and had 3 severe headaches.

Case 8: Mrs. S., age 27, has had periodic hemicranial headaches of 3 days duration about once a month since the age of 9. They are associated with nausea but no scotoma. An incidental hypertension is being treated with thiocyanates and under that program she had about one-third as many headaches as usual. Three severe, typical headaches were relieved by E.C. 110 without side effects. A fourth required an injection of D.H.E. 45 after 4 tablets of E.C. 110 failed to give relief. Subsequently, she had abdominal cramps and was unable to sleep that night.

Case 9: Mrs. P., age 46, has severe, periodic migraine attacks about twice a year, putting her to bed for 2 days. D.H.E. 45 relieved one attack and the next was relieved with three tablets of E.C. 110 without reaction.

Case 10: Mr. B., age 46, has had periodic spells of scotoma, lasting about one-half hour followed by depression for 12 hours. There was no headache. The diagnosis was "migraine equivalent." E.C. 110 was without effect in alleviating the depression.

Case 11: Mrs. G., age 35, had typical migraine headaches for 17 years, unilateral, periodic, with nausea and vomiting, mild every other day and severe twice a week. Thiocyanates relieved some of the headaches but others continued. D.H.E. 45 produced nausea. E.C. 110 "always works." There have been no side effects.

Case 12: Mr. H., age 40, has had typical migraine headaches about twice weekly all of his adult life. After "trying everything" he was resigned to going without treatment. He has been able to relieve all but one headache with single tablet doses of E.C. 110. With the one failure he took a total of four tablets, and was tremulous and jittery for the rest of the day.

E.C. 110 has been tried in nine additional cases. One patient reported no relief and subsequent investigation brought out strong emotional factors as probable causative agents. Psychotherapy markedly decreased the headaches. In the other eight cases of typical migrain headaches, excellent and prompt relief has been reported. No adverse side effects were noted and these eight patients are enthusiastic in their praise of the treatment.

Summary

E.C. 110, a combination of ergotamine tartrate and caffeine, has been suggested for the treatment of certain types of headache associated with increased amplitude of excursion of the intra- and extra-cranial blood

vessels.

No serious side effects have been noted following the use of E.C. 110 in 12 patients. In one patient, nausea and vomiting followed the ingestion of a single tablet on two occasions. Great difficulty was encountered in evaluating this patient's complaints. One patient had abdominal cramps following 4 tablets, but other medication was also taken (D.H.E. 45 and KSCN). Two patients have noted restlessness and tremor, and one noticed insomnia, after taking an excessive number of tablets (4 and 5).

No relief was obtained in one case of migraine equivalent (mood change, without headache). Two patients with psychoneurotic tension headaches failed to get relief (one being the patient who vomited immediately after taking the tablets).

Two non-migraine headache patients whose headaches seem to be on the basis of vasodilatation reported excellent results with E.C. 110.

Eight patients with typical migraine attacks are very enthusiastic about the results of the use of E.C. 110.

EC 110 has been tried on nine additional patients. One reported no relief and subsequent investigation has shown strong emotional factors as probable causative agents. Psychotherapy has markedly decreased the number and severity of the headaches. In the other eight cases of typical migraine headaches, excellent and prompt relief has been reported. No adverse side effects were noted in any case. These eight patients are enthusiastic about the treatment.

Conclusions

E.C. 110 has been very effective, and without serious side effect, in the relief of migraine and other vascular headaches in a small number of patients. The optimum dose seems to be one to two tablets, taken at the onset of the first warning of a headache. The oral route obviously has many advantages. Further trial seems indicated.

Author's Note: Supplies of E.C. 110 for this study were made available by the manufacturer, Sandoz Chemical Works, Inc., through its office in San Francisco, California. The product, E.C. 110, is being marketed by Sandoz Chemical Works, Inc., under the commercial name "Cafergone."

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A CORRECTION

In the March, 1949 issue of "Diseases of the Nervous System" (Volume X, No. 3), the article "Psychotherapy in Chronic Ulcerative Colitis" appeared on page 84. The title failed to include the name of the author. This paper was contributed by Dr. John D. Trawick, Jr., Assistant Professor of Psychiatry at the University of Louisville Medical School, Louisville, Kentucky. The editors regret this omission.

*Modifiable Factors in Anxiety Reactions**

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There is general agreement among child psychiatrists that anxiety reactions, as well as other emotional disturbances of children, are indicative of disturbed family relationships. It is also a recognized fact that children recover quickly from temporary family emergencies or pressures. Therefore it is obvious that anxiety reactions in children are symptomatic of long continuing tensions disturbing the inter-personal relationships within the close circle of individuals which makes up their emotional world. Without discussing the several theories of the nature of anxiety, it is enough to describe it as a constant state of apprehension brought on by an overload of emotion associated with the need to be an accepted and wanted member of the group. In the child, awareness of his dependency and fearful lack of confidence in those upon whom he depends is often the basis of the emotional disturbance. The constant sense of impending doom produces in children a variety of responses. Some react with physical symptoms; others with night terrors or sleepwalking; some react aggressively with temper tantrums or outbursts of violence; others show obsessive traits or talk of death; some react with apathy akin to the paralysis from fear. But never is the reaction unrelated to the family situation. For this reason, treatment should not be limited to the child alone. Realistically, the adults of his environment are always involved. They may be antagonistic, belittling, or suspicious; they may be helpful or understanding. Whatever their attitude, it is perceived by the child and has a direct effect upon him, either to increase or decrease the existing load of anxiety. But this cannot be left to chance; therefore the parent or other responsible adult must have an active, planned part in the treatment.

Knowing that long continued family tension or friction is basic to anxiety reactions is not enough. Most child psychiatry is on an out-patient basis, and little progress can be expected unless the environmental stresses on the family are also considered. Effective as individual treatment can be, it is putting a great burden on the patient and possibly exposing him to a more frustrating experience to expect him to cope in the unchanged situation where he previously developed anxiety. (This is as true for adults as for children). The neighborhood, the conditions under which the father works, the school with all of its ramifications, and all the mores and socio-economic aspects of the community are of importance. With these latter factors, the cooperation of the community agencies and groups is essential. Neither the physician nor the family can do the job alone.

The anxiety reaction of the child can only be understood by seeing it as the response of an anxious individual which is symptomatic of a disturbed family which may in turn be symptomatic of a disturbed community. In one sense the anxiety state is a method of dealing with a situation beyond the control of the child—as real as a call for help by a drowning person. The following is a case in point.

Betsy E. was a nine year old girl, referred to a psychiatric clinic by the Public Health nurse and the family physician with the story of screaming spells at night. Betsy's symptoms began a year before with irritability, tendency to go off and cry alone, moist palms and nervousness. After four months this cleared up almost entirely for eight months, only to recur suddenly. For the month preceding the psychiatric examination she was alternately excited and depressed, feared going to bed and would cry until she fell asleep. Then she began to awaken in the night, screaming and obviously frightened and talking of spiders and snakes. (In desperation and to spare the neighbors the parents would drive in the country until she fell asleep, often after an hour or so). On the night before being seen at the clinic, she told her mother hesitantly of her fear of dying and being buried in the ground. In further elaboration, the mother explained that the husband of Betys's adored teacher had committed suicide the year before. There had been great excitement at the funeral, with the teacher trying to leap into the

*Presented to the Southern Psychiatric Association, Dallas, Texas, December 6, 1948.

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grave. Although Betsy had not seen this, it was the chief topic of conversation for both children and adults for a time.

At the first interview Betsy hesitantly told of dreams of robbers carrying her away, of her mother dying, and of her being sent to an orphanage because her father didn't want her. She told of the death of her teacher's husband and of the death of a cousin. She then told how her brother had teased her with the song, "Did you ever think when the hearse rolls by....." Her imagination added the details and she thought "it would hurt to have the fat fall off and be nothing but bones." At the second interview she played out the fears of a child in bed who believed a witch could change a cloth to a rat as soon as it was dark, and back to a cloth with the light on. Anxiety symptoms were noticeable during this play. In subsequent interviews Betsy worked through fears of choking, of being unable to breathe, of being poisoned by touching a dog which might have been near poison. The recurrence of symptoms was also explained by her story of how the pellets from a shot-gun fired into the air fell about her and she ran screaming the quarter mile home, certain that she had been shot and would die.

During this same period work with the mother brought out her worry over her own health and an impending major operation. Betsy's concern over this was shown by her fear of leaving her mother alone in the house because there was no telephone if she became ill. Later in treatment the mother reported that she had just learned that the teacher had had "nervous spells" during which she had Betsy take her to the basement where she bathed her wrists in cold water. The mother was greatly disturbed by this misuse of the child's affection, however passing to the next grade effectively dealt with this problem.

Within three weeks the night-mares and screaming dropped to occasional bad dreams. Betsy continued to worry about choking but responded easily to her mother's reassurance. At the end of three months she used the pattern of fright in an attempt to punish her father for scolding her and was quite aware of what she had done. Improvement continued for three more months during which she was seen occasionally. In the next six months there were major operations for both mother and father which Betsy weathered without more than average concern. An appendectomy for herself a year later brought no increase in anxiety.

Betsy was last seen at the age of 11½ years and although a somewhat tense child had had no symptoms of anxiety and had forgotten all except that she once believed witches were real.

The complete background problem was not solved, but several factors were modified. With this, plus increased understanding by mother and child, Betsy could begin to deal with her fears—even to the point of deliberately using her previous anxiety.

For the child who has lost his own home and must rely on the good offices of relatives or upon social agencies, the base level of anxiousness is much higher and the danger of anxiety overflow correspondingly greater. James Plant has pointed out that belonging to and being important to a group is a basic requirement for the mental health of an individual. To insure any satisfactory later social adjustment a child must experience this. To feel discarded, unwanted, and a burden is a crushing load for a child and may result in aggressive outbursts to relieve his fear, in withdrawal into a world of his own where he no longer has to face his anxiety, or in hypochondriacal bids for sympathy on a dependency basis. Take for example, this case:

Susan B. was a twelve year old girl referred to a psychiatric clinic by the visiting teacher and a private physician with the complaint of "pains, feelings of suffocation, fear of death, and other nervous disorders." When seen, the child was anxious and breathless, showing widely dilated pupils and absent gag reflex. She gave the history of having had her tonsils out two months previously. She had worried about the operation and was frightened and screaming as she took the ether. Both on going under and on coming out of the anaesthesia she feared she was dying. The painful throat and blood stained mucus of the next few days frightened her, but she returned to school. A month later she awakened after a dream of going under ether and feared it was a warning that she was dying. She thought she had appendicitis, but her grandmother told her to forget about it. The next day she developed pain in school and was sent home. This was repeated twice with negative physical examination each time, and she was then referred to the psychiatric clinic.

Past history for Susan was hectic. Her father was in prison. Her mother died of cancer when Susan was three. She went to live with an aunt who died suddenly when Susan was seven. Her older brother went to live with the maternal grandmother and remained there. After the first aunt's death Susan lived with another aunt and then at nine years went to her grandmother's home where her brother already was. This home was composed of her grandmother and her fourteen year old son, her step-grandfather and his nineteen year old daughter, Susan's fifteen year old brother, and twelve year old Susan. The young uncle resented the intrusion of a girl who took his place as the youngest in the family and said so frankly. Susan felt she had no place there and doubted if any one, except maybe her step-grandfather, cared for her at all.

With the onset of her anxiety attacks, Susan received much attention, although the family

doubted if anything were wrong with her. In the course of treatment the visiting teacher helped all the adults to a better understanding of Susan's worry and they were amazingly tolerant.

For two months Susan discussed her complaints but never quite recognized how much they were connected with her jealousy of her brother and young uncle. She believed every superstition about dying and continued to show physical symptoms of anxiety. Just as some progress began to be made the grandmother died suddenly of pneumonia and Susan had to begin all over again. The step-grandfather continued to be Susan's security but with the help of the visiting teacher, his daughter became an even greater asset in treatment. With recognition of her value as a helper in the home, Susan took more responsibility and showed less anxiety. She became able to discuss her precarious position and face plans for the future. She hoped to remain in the family and this eventually proved possible. At the same time the school gave her deserved recognition for her good singing voice and the combination of home and school respect gave Susan her first sense of belonging. After six months' contact school, family, and clinic, as well as Susan, felt she could carry on adequately.

Both in children's choice of stories and in their dreams the need for secure anchorage and the fear of being cast adrift in a limitless world is met again and again. The world appears as a hostile place filled with enemies or wild animals in the dreams of anxious children, and in their play their preoccupation with this theme and their need to conquer these dangers is frequently repeated. The well remembered obsessive superstitions of childhood—"Step on a crack, break your mother's back"—or some other obsessive rite may become necessary to the preservation of their small supply of security. Illustrative of this is the following:

Johnny was a thirteen year old boy referred to a psychiatric clinic by a caseworker of a children's agency. The original complaint was that Johnny made excessive demands on his foster parents for attention and affection. During the psychiatric interview Johnny brought out his unease in crowds and his feeling of anger at people. This led to his describing how he counted his steps whenever he walked, and this made him "kind of mad at people." He counted all movements while sitting. He had to count his steps on grass and take an equal number on bare ground; he had to have an even number of bites of any one food; he had to scratch his clear arm as many times as he did the one with poison ivy. He dated the onset to about the beginning of the school year and rather thought it meant he was nervous. Spontaneously he said he felt nervous whenever he thought of his parents. In addition to this he showed the usual concern about not being able to live with his own family.

Johnny's past history was confused. He was the youngest of four children. When he was eight his father died of cancer and his mother died of cancer and tuberculosis when he was ten. During the next three years Johnny was in six homes, four times returning to relatives, not all of whom accepted him. His sister developed tuberculosis and one family feared he would infect them so sent him away. In one foster home he was expected to replace their own son who had died and when this did not work out he was moved with only a day's notice. In the last foster home they tired after two months and wanted a vacation from him. During interviews Johnny could not accept the situations and always offered another explanation for his being moved.

His counting appeared to relate to his wanting to be fair to both of his dead parents. Associated with this was his sense of being unwanted by any one except these same parents. A Thematic Apperception Test brought out his sense of being pushed around by everything and every one, his belief that conformity was his only protection and the sense of having to atone for all misdeeds.

A new foster home placement became suddenly necessary and the only one available was used. Here Johnny returned to school and friends previously known. His family knew the foster mother and she, having had sons, could accept his boyishness and was not frightened by his need for affection. Because there was no man in the family Johnny accepted this more responsible role and showed unexpected maturity. With this security his obsessive counting disappeared. Johnny's explanation was that the compulsion to count was because he "didn't know any of the kids or nothing" and did not know what would happen to him next.

Johnny's clinging to his own family is a usual finding among adolescents with broken homes or even with rejecting parents. The need to belong to and be wanted by a group and the need to be valued as an individual is very clearly seen during adolescence. At an age when the world is seen through the haze of their own instability in the transition phase from childhood to adulthood, these adolescents cling tenaciously to whatever fragments of an "own family" they can find. To insist upon a transfer to a strange family group is often to precipitate an anxiety reaction. The better the foster family the greater is the anxiety produced in the adolescent who sees belonging to one family ex-

changed for toleration by a new family. He has no faith yet in his ability to make a place for himself and sees himself dangling from an already formed family upon which he has no real claim. This is why placement in a group setting with others of his own age often results in better adjustment at this stage of development. (It is also the reason why careful study is especially important in the placement of adolescents outside their homes).

Today there is a great deal of discussion of "preventive psychiatry" and also a great deal of pessimism expressed concerning this. "Preventive medicine" is a broad subject which includes all our present knowledge of healthful living as well as specific methods of immunization and prevention of epidemics. Similarly, "preventive psychiatry" includes the broad principles of mental health fundamentals, both individual and social. Often the awareness of how much is yet to be learned about the causes of specific psychiatric disorders has obscured the extent of present knowledge of causative and contributive factors in emotional illnesses. Just as industrial health points out hazards to life and limb so psychiatry has the responsibility of pointing out the industrial conditions which affect the emotional adjustment, and therefore the efficiency of the individual worker. The effect of overcrowded living conditions on spread of epidemics is considered a health problem—but obviously also affects the mental health by destroying the sense of individuality and privacy essential to the average person and by denying children the space to experiment with self-assertive drives —giving them frustration instead of a growth experience.

All of this is part of "preventive psychiatry." In certain situations we have responsibilities as citizens but above that we have the responsibility as psychiatrists to focus attention on those conditions which contribute to emotional maladjustments on a wide scale.

This responsibility is especially urgent in relation to children. Both directly and indirectly children are affected by community stresses and strains. Without attempting to cover all areas in which modern psychiatry can aid in preserving the mental health of children, two fields are immediately apparent—the schools and the care of children without homes.

No exaggeration is possible of the importance of the atmosphere in which the child spends six hours every schoolday—and either anticipates or dreads for the rest of his waking hours. Unstable individuals who use the schoolroom as an outlet for their bullying or other immature drives are fortunately not common. More common is the over-worked teacher attempting the impossible job of teaching forty children in a room built for twenty-five, or for a storeroom. How can we expect calm, reasonable behavior and effective teaching under these conditions? The amazing fact is that we often find it. However, this and many other situations in the schools add to the burden of both teachers and children—and may mean the difference between a child being able to deal with the anxiety growing out of his home conditions, or with this additional load, developing an anxiety state. It must be admitted that not every child develops an anxiety reaction, but neither does every person get typhoid fever from contaminated water and yet we insist on purification.

The problem of dependent children without homes is larger than is usually recognized. Annually 110,000 children have to be given institutional or foster home care in this country. This represents a goodly number of potentially maladjusted adults, as both psychiatrists and courts can testify. The possibility of a good marital adjustment is markedly less for a person who has not had the experience of living in a family. The recognition that more than food, clothing, and shelter is necessary for a healthy childhood indicates that there is knowledge to be used on this problem. The fact that most of these children are already public responsibility is an added incentive for action. In the here and the now are these children whose place in the world has been destroyed and only be seeing that they have an approximation of the family experience, that they retain their individuality and sense of personal value, can they be protected from a load of anxiety which will cripple them for life. It becomes necessary to make use of our present knowledge of factors contributing to emotional disorders and advise with those who have the responsibility for programs and

policies affecting the well-being of these children.

Summary

Although the anxiety reactions of children develop in a setting of disturbed family relationships, the stresses and strains of the community often increase the severity of the reaction. No treatment of the child can be effective without the parent entering into the treatment plan. But beyond the direct control of the parent are many community factors which can be modified to give the patient more opportunity of continuing improved adjustment. It is in this area that "preventive psychiatry" becomes important. For too long the lack of complete knowledge of the causes of psychiatric disorders has been given attention with the result that the useful body of knowledge has been overlooked. Modification of many of the factors in the production of anxiety is possible. By making available the psychiatric knowledge now held, groups and communities can plan programs designed to avoid adding too greatly to the tensions, strains, and fears which appear now to be an inherent part of the maturing young human.

Neurological Clinical Pathological Conference

OF THE CINCINNATI GENERAL HOSPITAL

CHARLES D. ARING, M.D., Editor

CASE NO. 410561

Presentation

An 18-year-old white boy was admitted to the hospital June 10, 1941 complaining of headache, stiff neck and vomiting of 6 weeks' duration. The preceding year he was forced to relinquish the sophomore year in high school and remain home because of ill health. Six weeks before entering the hospital he began complaining of pain and stiffening of neck muscles which was followed shortly by generalized headache. Two weeks prior to admission he suffered several episodes of projectile vomiting and during the week antedating admission he had trouble swallowing. There was a gradual increment of all symptoms; although the headache was somewhat relieved by assuming the prone position and was aggravated by sudden changes in position. There was a vague story of photophobia, diplopia and inconstant pain over the anterior medial aspect of the left thigh.

The patient had always been somewhat sickly and slightly retarded mentally. His skin had always been studded with small brown lesions overlying nodules beneath the skin. At the age of 6 years some nodules were excised from the lumbar region and shortly afterward a course of roentgen therapy administered.

The family history failed to contribute to an understanding of the patient's illness.

The initial hospital examination revealed poor nourishment. He lay in a somewhat opisthotonic position with the knees flexed. The skin was studded with soft subcutaneous nodules of varied size and scattered, irregular, brown spots; the skin of the left thigh was covered with an unusually luxuriant growth of hair. The cervical muscles were tender to palpation, the neck resisted flexion although it could be rotated with ease; Brudzinki and Kernig signs were obtained. The deep reflexes were hypoactive in the upper extremities and absent in the lower extremities; the skin abdominal and cremasteric reflexes were present and the plantar responses flexor. Sensory abnormalities were limited to a small area of hyperalgesia over the anterior medial surface of the left thigh.

The pupils were slightly unequal and reacted sluggishly to light. There was approximately 2 diopters of papilledema bilaterally and a few small flame-shaped hemorrhages near the disc margins. The right side of the palatal arch moved less well than the left and there was a diminished gag reflex on the right.

During the first few days in the hospital his condition remained essentially unchanged

except as there was some difficulty swallowing. On June 13 a suboccipital craniotomy was performed followed by lumbar puncture, ventriculography, craniotomy and removal of the right cerebellar tonsil and sufficient tissue along the roof of the fourth ventricle to obtain free flow of cerebrospinal fluid through the aqueduct.

Post-operatively he was slow to regain consciousness. Upon examination 10 hours after operation all extremities were flaccid; the pupils were dilated and fixed to light, the left being somewhat larger than the right; the left side of the face was weak; the pulse was rapid and thready and the blood pressure unobtainable. He responded promptly to intravenous blood, glucose and saline. Thirty hours post-operatively he was awake and talking rationally. He continued to have difficulty swallowing so that tube feedings were required.

On the tenth post-operative day the fundi remained unchanged, the pupils were equal and reacted to light, the extra-ocular movements could not be adequately tested but there was a rapid coarse horizontal nystagmus on right lateral gaze. The left side of the face was weak, speech dysarthric and swallowing difficult, plantar responses were absent. Deep roentgen therapy was administered for approximately a week and was finally discontinued as the patient's stupor deepened and the decompression became tense. Although the latter softened he failed to respond and expired on the twentieth hospital day.

On admission the temperature was 98.2 degrees F., the respirations 20, the pulse 80 and the blood pressure 135/80.

Laboratory Data: On entering the hospital blood counts, hemoglobin determination and serological reaction were normal as was the urinalysis. Roentgen examination of the skull, cervical, dorsal and lumbar spine failed to reveal abnormality. Ventriculography demonstrated the ventricular system to be uniformly dilated and the lower end of the aqueduct of Sylvius to be displaced to the left with failure of filling below this site. No air was present in the subarachnoid spaces.

The cerebrospinal fluid chlorides and sugar determinations and serological reaction were normal, and smears for organisms revealed none. A colloidal gold curve on the fluid obtained on June 13 gave a weak mid-zone reaction (0123322100).

Date	Initial Pressure mm. water	Appearance
June 2	Traumatic tap	Bloody
June 3	280	Clear
June 6	140	Clear
June 13	420	Sl. bloody

Date	Lymphocytes per c. mm.	RBC per c. mm.	Protein mg. %
June 3	80	....	...
June 6	25	....	...
June 13	2	1017	202

Differential Diagnosis

Dr. Harry M. Salzer: An 18-year-old boy had an acute illness lasting over a period of 6 weeks, the main symptoms being headache, stiff neck and vomiting all of which are suggestive of increased intracranial pressure. The stiff neck might represent meningeal irritation. Two weeks prior to admission he suffered several episodes of projectile vomiting which is interpreted as additional evidence of increased intracranial pressure. The past history was not felt to be contributory and the fact that the patient remained at home the past year on account of ill health probably is not immediately important.

First let us consider symptoms of localizing value. The difficulty in swallowing suggests involvement of the medulla or the nerves between the medulla and pharynx. The fact that the headache was relieved with the neck muscles at rest when the patient assumed a lying position, does not appear to be helpful in localization. The photophobia and diplopia are probably of no localizing significance, the diplopia suggesting involvement of the oculomotor system. The inconstant pain over the anterior medial aspect of the left thigh suggests localization in the lumbar root area. Hyperalgesia over this area suggests an irritative lesion of root L-2 or L-3.

In view of the past history that at an early age the patient was known to have had small brown lesions overlying nodules beneath the skin, and at 6 had some subcutaneous nodules excised from the lumbar region, nerve roots may have been damaged at that time; the later hyperalgesia suggests nerve root irrita-

tion rather than destruction. He may have had vonRecklinghausen's disease or the nodules could have been produced by a neuroblastoma although this is not likely; the latter are very malignant tumors.

The findings on examination important from a localizing standpoint were the following: the Brudzinki and Kernig signs indicate that meningeal irritation was present. The impaired movement of the palatal arch on the right, the diminished gag reflex on the left, and the difficulty in swallowing indicate involvement of the ninth and tenth cranial nerves.

The spinal tap on June 3 showed a high pressure of 280 mm. and 80 lymphocytes per c. mm. The normal pressure of 140 mm. on June 6 may have been effected by the previous tap. The pressure in the tap on June 13 was very high, 420 mm. and the total protein 200 mg. per cent. The number of red cells, 1017 per c. mm., does not account for the elevation in the protein. The gold curve gave a weak mid-zone reaction which is of no help in making a diagnosis. The white blood cells in the cerebrospinal fluid suggest that an inflammation was in progress. As usual in difficult cases like this, these cells may have been tumor cells.

On the third hospital day a suboccipital craniotomy was performed. The post-operative history was not helpful in localization. Upon examination 10 hours after the operation all extremities were flaccid; pupils were dilated and fixed to light, the left being somewhat larger than the right; the left side of the face was weak; the pulse was rapid and thready and the blood pressure unobtainable. There was a rapid coarse horizontal nystagmus on right lateral gaze; speech was dysarthric, and swallowing difficult. All these findings suggest something going on in the right cerebellum or the pons, some of which however may have been the result of post-operative edema.

The first diagnosis I considered was that of pontine glioma but this is unlikely because of insufficient involvement of the cranial nerve nuclei. The most likely site of localization in this case appears to be the cerebellar midline and to some extent the right cerebellar hemisphere.

vonRecklinghausen's disease with associated acoustic neuroma should be considered in view of the high cerebrospinal fluid protein. Eighty-five per cent of acoustic neuromas have cerebrospinal fluid proteins above 100 mg. per cent. The onset in our patient seems to have been too rapid for acoustic neuroma and there was no pre-operative involvement of the seventh nerve which probably would be affected in acoustic neuroma. Also the functions of the fifth and eighth nerves were reported as normal.

Diffuse cerebral glioblastosis is unlikely without involvement of more cranial nerve nuclei. If he had had neuroblastoma at the age of 6 years, his disease would not have lasted so long. There may have been an inflammatory process such as tuberculous meningitis but the cerebrospinal fluid cell count and the sugar and chlorides were normal.

Medulloblastoma in the midline of the cerebellum with pressure downward onto the medulla could produce the difficulty in swallowing and palatal signs. The tumor must have been large enough to extend cephalad to displace the aqueduct. These tumors metastasize, which might possibly account for the area of hyperalgesia in the left thigh. In that case the cells in the cerebrospinal fluid may not have been lymphocytes but tumor cells.

These tumors grow rapidly and are usually responsive to x-ray. They occur more frequently in childhood but occasionally are seen at a later age. In the *Archives of Neurology and Psychiatry* for April 1947, Grant reported that 30 per cent of medulloblastoma in his clinic had occurred in adults. I favor cerebellar medulloblastoma as the diagnosis in this case.

Pathological Discussion

Dr. Murton Shaver: Autopsy was performed 16 hours post mortem and the brain, spinal cord and portions of the lumbar plexus together with the sympathetic chain and attached tumor nodules were submitted for examination.

The dural cap was not remarkable aside from the presence of a small extradural hematoma, measuring 6 cm. in width, a firm blood clot adherent to the outer surface of the dura in the left posterior parietal region. This was located in a circumscribed area around the perforation corresponding to the

site of operative trephination and ventricular tap.

The brain showed a slight depression in the region of the extradural hematoma but otherwise the hemispheres were symmetrical and the convolutional pattern normal. There was some generalized flattening of the gyri and narrowing of the sulci over both hemispheres. There was generalized, light-brown discoloration and questionable slight thickening of the leptomeninges. Convolutions in the central areas bilaterally and in the right temporal region appeared markedly widened and firmer to palpation than normal. The surfaces of these convolutions were somewhat lighter in color than the adjacent gyri. There was moderate herniation of the left cingular gyrus under the falx anteriorly.

The cerebellum was large and there was a well defined pressure cone. The pons appeared rather flattened and widened. The leptomeninges here were slightly discolored and thicker than normal. The optic chiasm was thicker and grayer than usual and there was some bulging of the floor of the third ventricle.

Coronal sections of the cerebrum revealed unusual firmness of the tissue comprising the prominent gyri described previously. In these areas the cortex was less distinct and narrower. Anteriorly the midline structures including the fornix and septum pellucidum had been displaced to the right with some increase in size of the left lateral ventricle. More posteriorly, both lateral ventricles were enlarged; the ependymal wall was smooth and regular in outline. The ependymal wall of the third ventricle showed small irregularities which were grayish and rather firm to palpation.

Sections through the cerebellum and brain stem showed the left cerebellar hemisphere to be larger than the right. In the midline roof overlying the fourth ventricle, softened hemorrhagic tissue of gelatinous appearance was seen. The central portion of the right cerebellar hemisphere was densely white in color with obliteration of the cerebellar nuclei. Below this point and projecting from the roof of the fourth ventricle was a nodule which was firm and white in color. A similar less sharply defined discoloration of the left hemisphere was noted in the central portion, the change extending into the folia in some areas. The middle cerebellar peduncles and the pontine tissue in this region showed some pallor and firmness with irregular protrusions into the walls of the fourth ventricle. A poorly-defined, pallid area was noted in the central medulla, and a gray gelatinous material was found lining the fourth ventricle and extending rostrally into the lower portion of the aqueduct.

Sections through the spinal cord revealed generalized thickening of the leptomeninges which were gray in color; there was thickening of spinal roots which appeared similarly gray in color. The central gray matter was preserved and fairly well defined in the sections. At one place in the lower cervical region, sections revealed what appeared to be early softening in the posterior portion of the cord.

A portion of the left lumbar plexus of nerves with attached tumors had been preserved. One large tumor mass, measured 11 x 10 cm. The attached nerves showed marked thickening which on section appeared to be diffuse in character, the tissue having a fibrous appearance. Section of the tumor itself showed areas of necrosis where the tissue was gelatinous in consistency and grayish yellow in color; in other areas it was rather firm and fibrous. No definite areas of penetration of the capsule were noted. Other small tumor nodules measuring up to 3 cm. in length were submitted attached to rather thickened nerves removed from the sympathetic chain. These small tumors appeared fibrous in part and other areas were gelatinous and soft. Some of the tumors were rather firm throughout. No areas of hemorrhage were observed.

Microscopic examination of blocks of tissue removed from the posterior frontal and the temporal regions at the site of the large protruding gyri revealed the leptomeninges to be generally thickened with layers of tumor cells, thinner over the surface of the gyrus but thicker in the sulci. These cells were polyhedral in some cases with a small amount of pink staining cytoplasm and vesicular nuclei. The majority of the cells, however, showed elongated nuclei which were rather deeply stained and intercellular fibrils appeared to be produced by many of the cells. Some of these fibrils resembled collagen in staining properties but were fine and

wavy. Mitotic figures were found in a number of these cells. This tumor tissue tended to spread in the subarachnoid space and extended along the penetrating vessels into the deeper layers of the cortex, and rings of similar cells were found around the deeper vessels in the white matter. There appeared to be some invasion of the vessel walls in many cases. The tumor invasion was found generally over most of the areas of the cortex examined.

The cortex itself showed some areas in which the cyto-architecture was markedly disrupted with large numbers of rather large nerve cells scattered irregularly in clusters, and gliosis in these same areas. Numerous protoplasmic astrocytes were found especially in the sub-pial layer. Gemistocytic astrocytes were found in large numbers in some places. Many of the other nerve cells showed altered polarity, lying parallel to the surface and in general there was some chromatolysis with swelling, displacement or loss of the nucleus and ischemic changes. A few scattered nerve cells were found in the white matter underlying the cortex. The underlying white matter showed diffuse demyelination most marked in the central portion with vacuolation throughout. In these areas there was a generalized increase in the astrocytes, mostly of a fibrillary type although some of the cells were gemistocytic. However, there were no areas of dense fibrillary gliosis.

Sections through the basal ganglia and brain stem demonstrated the presence of tumor cells infiltrating the leptomeninges, penetrating the subarachnoid space and extending deeply, following the perivascular spaces into the brain stem. They followed vessels into the temporal horn of the lateral ventricle. There were some indefinite areas of fibrillary gliosis underlying the ependyma of the lateral and third ventricles. A few cells resembling gemistocytic astrocytes were seen in these areas. No definite demyelination was observed in sections of the brain stem. The nerve cells generally showed swelling and many ischemic changes with chromatolysis and nuclear change.

Sections through the cerebellum showed similar but more diffuse scattering of spindle-shaped tumor cells throughout the subarachnoid space, extending deeply into the cerebellar tissue at times. These cells in some areas, assumed a polyhedral appearance with pink staining cytoplasm while in other areas they appeared to be producing collagen fibers. Mitotic figures were observed in numerous instances. In several areas these cells appeared to be actively invading the cerebellar hemisphere and in some of these areas the adjacent cerebellar tissue showed rarefaction and softening with invasion by large numbers of histiocytes. A wide area in the central portion of the hemisphere showed demyelination with degeneration of the neurofibrils and scattered, diffuse proliferation of the astrocytes.

Sections of pons showed similar invasion of the subarachnoid space and leptomeninges with tumor cells which extended deeply into pontine tissue. In the peri-aqueductal region, were large areas of fibrillary gliosis some of which were circumscribed, projecting beyond the wall of the fourth ventricle. In some of these areas, there were large numbers of gemistocytic astrocytes. Areas of gliosis and rarefaction of white matter were found scattered throughout the pons.

Sections through the medulla showed similar tumor invasion in the leptomeninges and indeed these findings were repeated throughout all sections taken through the spinal cord. Here the invasion extended along the vessels in perivascular spaces but no active invasion of the surrounding parenchymal tissue was noted. In the lower cervical levels, the posterior portion of the cord showed degeneration of both myelin and neurofibrils with preservation of the anterior portion of the cord.

The spinal nerves showed perineurial cuffing by tumor cells and some of these cells had invaded a number of the roots to surround individual nerve bundles. The spinal nerves showed diffusely scattered areas of degeneration of myelin and neurofibrils. The neurofibrillary degeneration was less marked than that of the myelin sheaths. The tumor infiltration of the meninges, and in the cerebellum the infiltration of the parenchymal tissue, was associated with polymorphonuclear infiltration which in some cases was rather extensive.

Sections through the large tumor removed from the lumbar plexus showed the firm tissue to be composed of a dense, streaming, arrangement of spindle-shaped cells having

pallisade arrangement in many cases and producing fibrils with the general appearance and staining properties of collagen. In other areas, the cells showed variation in size, shape and arrangement, and mitotic figures were found rather frequently. In still other areas, the tissue had a mucinous appearance. Other tumor nodules showed no malignant changes; one smaller tumor showed a large number of mitotic figures and pleomorphism. In some of the tumors it was possible to demonstrate neurofibrils scattered between the collagen fibers. The sections through the sciatic nerves demonstrated diffuse demyelination, with degeneration of the neurofibrils in some cases which was not as severe as the degeneration of the myelin. There was some infiltration by tumor cells similar to those in the leptomeninges. Diffuse fibrosis was observed where degeneration was most marked.

In summation, it may be stated that this case demonstrates well-defined neurofibromatosis with tumors involving the sympathetic and lumbar plexus in the abdomen as well as numerous intradermal nodules, as described by vonRecklinghausen. Some of these tumors showed malignant degeneration and are to be diagnosed as neurofibro-sarcomas. These tumors probably were responsible for the pain in the left thigh, of which the patient complained.

In addition, there was diffuse fibro-sarcomatosis of the leptomeninges, involving the surfaces of the brain and spinal cord. In the cerebellum, there was invasion of the cerebellar substance by the tumor. Similar involvement of the diaphragm of the sella, as demonstrated in sections of the pituitary, would suggest that these tumor cells surrounded cranial nerves, an explanation of the cranial nerve signs.

There was uniform dilatation of both lateral ventricles in their posterior extent which was probably in part relieved by the suboccipital craniotomy.

The mental retardation in this case possibly may be explained by the finding of some of the lesions usually associated with tuberous sclerosis. This definitely was not a well-defined case of tuberous sclerosis but the condition often has been found associated with vonRecklinghausen's disease. There were some of the changes in the cytoarchitecture of the cortex with enlargement of gyri in locations usually involved in tuberous formations. In addition, diffuse demyelination and gliosis were demonstrated in subcortical areas which may be partially explained by the interference with vascular supply by the perivascular tumor invasion. Subependymal areas of gliosis is also found in tuberous sclerosis.

VonRecklinghausen's disease has been associated with meningioma in a few cases, but I am not aware of any case having been reported associated with sarcomatosis of the meninges. However, whether the tumor involving the central nervous system is primary, or secondary spread from a local tumor nodule undergoing malignant degeneration cannot be positively stated here. The fact that the invasion of the leptomeninges was associated with cerebellar involvement would explain the cerebellar signs demonstrated in this case.

Clinical Diagnosis

Neurofibromatosis (vonRecklinghausen's disease).

Tumor (neuroma) in posterior fossa on ninth or tenth nerve.

Tumor (neuroma) in cauda equina.

Dr. Salzer's Diagnosis

Medulloblastoma, midline cerebellar.

Anatomical Diagnosis

Neurofibrotomatosis with sarcomatous degeneration.

Sarcomatosis of the leptomeninges.

Myelomalacia (lower cervical region) due to circulatory disturbance (obstruction of posterior spinal arteries).

Book Review

POSTTRAUMATIC EPILEPSY. By A. Earl Walker, M.D., Formerly Professor of Neurological Surgery, University of Chicago, Chicago, Illinois. Now, Professor of Neurological Surgery, The John Hopkins University, Baltimore, Maryland. Fabrikoid. Price, $2.75. Pp. 90, with twenty-eight illustrations and six tables. Charles C. Thomas, 301-327 East Lawrence Avenue, Springfield, Ill.

In this monograph, the author has presented concisely an overall picture of the syndrome of posttraumatic epilepsy. The sections on the neuropathology of the cicatrix and alterations in neural activities are of particular interest and their value is enhanced by technically excellent photographs and well chosen illustrations.

The graphic description of the clinical seizure should be informative to the student or general practitioner.

While the portion devoted to surgical treatment is quite adequate, the section concerned with medical management suffers from brevity.

This study is based on the author's personal experiences as well as that of other researchers in the field. There is an extensive bibliography of eighty references appended.

John L. Otto, M.D., Galveston, Texas.

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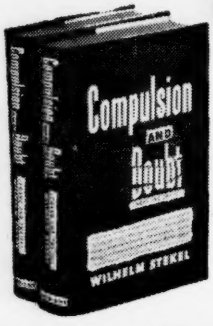

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